

Remarks

Claims 1-10, 18-25, 28, 29, and 35 were pending in the subject application. Claims 5, 22, and 23 remain pending but withdrawn from consideration. Accordingly, claims 1-4, 6-10, 18-21, 24, 25, 28, 29, and 35 are currently before the Examiner for consideration. Favorable consideration of the pending claims is respectfully requested.

Claims 1-4, 8-10, 18-21, 28, 29 and 35 are rejected under 35 USC §112, first paragraph, as lacking sufficient written description and as non-enabled by the subject specification, and under 35 USC §112, second paragraph, as indefinite. The Examiner asserts that there is no support in the specification for a “non-branching sol-gel active portion of a dendrimer substrate” and that there is no teaching of how to form a sol-gel active site on a non-branching portion of a dendrimer substrate.

Applicants respectfully assert that there is support for the claim language and that the claims as filed are definite. Dendrimers of the present invention have a branching portion and a non-branching portion (see, for example, Figures 5-8 of the subject specification, which show schematic representations of exemplified reactions). Applicants note that the subject specification, at page 11, paragraph 00051, refers to the functionalized dendrimers of the present invention as having “tree-like branched architecture.”

Applicants respectfully maintain that the language used in an amendment of a claim does not have to be disclosed word for word in a specification. *In re Wilder*, 222 USPQ 369, 372 (Fed. Cir. 1984) (“It is not necessary that the claimed subject matter be described identically, but the disclosure must convey to those skilled in the art that applicant had invented the subject matter later claimed.”); *In re Lukach*, 169 USPQ 795, 796 (CCPA 1971) (“... the invention claimed does not have to be described in *ipsis verbis* in order to satisfy the description requirement of §112.”). In addition, the Patent Office guidelines for examiners make it clear that explicit written support is not required to meet the requirements of 35 USC § 112, first paragraph. (“To comply with the written description requirement of 35 U.S.C. §112, ¶ 1, ... each claim limitation must be expressly, **implicitly**, or **inherently** supported in the originally filed disclosure.” (emphasis added) See “Guidelines for Examination of Patent Applications Under 35 U.S.C. §112, ¶1, ‘Written Description’ Requirement,” *Federal Register* Vol. 66, No. 4, pp. 1099-1111, at page 1107, first column, lines 10-17). Thus,

support for a claim limitation can be implicit or inherent in the disclosure of a patent application. Applicants respectfully assert that there is both explicit and implicit support in the specification for the term “non-branching sol-gel active portion” of a dendrimer moiety of the claimed invention. Therefore, the specification reasonably conveys to one of ordinary skill in the art that Applicants were in possession of the claimed invention at the time the application was filed. Furthermore, for the reasons given above, one of ordinary skill in the art could make and use the claimed invention from the teachings of the subject application, coupled with information known in the art, without the need for undue experimentation. Finally, the meaning of the phrase “a non-branching sol-gel active portion of a dendrimer substrate” is apparent from the specification as filed. The claims, when read in light of the specification, reasonably apprise those of ordinary skill in the art of the metes and bounds of the claimed invention. Accordingly, reconsideration and withdrawal of the rejections under 35 USC §112, first and second paragraphs, is respectfully requested.

Claims 1-4, 8-10, 18-21, and 28, 29, and 35 are rejected under 35 USC §103(a) as obvious over Malik *et al.* (WO 00/11463) in view of either Kim *et al.* (U.S. Patent Publication No. 2002/0020669) or Neumann *et al.* (DE 19 621 741) and the Patent Office’s translation of Neumann *et al.* (DE 19 621 741). In addition, claims 1-4, 8-10, 18-21, and 28, 29, and 35 are rejected under 35 USC §103(a) as obvious over Malik *et al.* (WO 00/11463) in view of either Kim *et al.* (U.S. Patent Publication No. 2002/0020669) or Neumann *et al.* (DE 19 621 174) and the Patent Office’s translation of Neumann *et al.* (DE 19 621 741), and further in view of Newkome *et al.* (U.S. Patent No. 5,703,271). The Examiner asserts that it would have been obvious to modify the column disclosed in the Malik and Wang publication to include a dendrimer given that the Kim *et al.* publication teaches that dendrimers bonded on supports are economically feasible, versatile, and useable in chromatography and also because the Neumann *et al.* patent teaches that the use of dendrimers increases the number of functional groups, thereby improving separation. The Examiner further asserts that it would have been obvious to use isocyanate in a column disclosed in the Malik and Wang publication in view of Kim *et al.* or Neumann *et al.* because the Newkome *et al.* patent teaches that isocyanate dendrimers have the flexibility of reacting with various chemical surfaces including siloxane and can be used in “column chromatography or the like for selective removal of

agent from the material flowing through the column.” Applicants respectfully traverse each of these grounds of rejection.

Applicants respectfully maintain that the claimed invention is not obvious over the cited references, regardless of whether the references are taken alone or in combination. The present invention is not obvious over the cited references since conventional dendrimers lack a non-branching sol-gel-active portion. If a person were to use a conventional dendrimer (*i.e.*, one without a non-branching sol-gel-active portion in its structure) in the sol-gel system taught by Malik and Wang (WO 00/11463), the dendrimer will not chemically bond to the sol-gel matrix. A capillary column coated with such a sol-gel matrix will not be effective as a stationary phase or as an extraction medium since the dendrimer molecules will be washed off the capillary column during any rinsing with solvents.

As noted above, conventional dendrimers do not possess a non-branching sol-gel active portion and none of the cited references teach how to prepare dendrimers with a non-branching sol-gel active portion. Applicants note that the Neumann *et al.* patent first derivatizes the silanol groups on a silica surface with sol-gel-inactive groups (*e.g.*, amine) leaving essentially no accessible silanol groups to participate in the sol-gel reactions for covalent attachment of the sol-gel dendrimer coating to the silica surface. Therefore, if the teachings of the Malik and Wang publication are applied to the derivatized surface of the Neumann *et al.* patent, the created sol-gel coating will not be chemically bonded to the fused silica surface (few accessible silanol groups after derivatization) resulting in an unstable coating which will be easily washed off the substrate during treatment or operation. Clearly, a person of ordinary skill in the art, utilizing the teachings of Malik and Wang and the Neumann *et al.* patent, would not arrive at the sol-gel dendrimer capillary of the present invention where the sol-gel dendrimer coating is covalently bonded to the sol-gel substrate on the fused silica capillary surface.

The combination of the Malik and Wang publication with the Kim *et al.* publication also fails to teach or suggest Applicants’ claimed invention. The Kim *et al.* publication teaches, as described at paragraph 0010 therein, derivatizing the dendrimer’s “exterior functional sites.” These exterior sites are on the branches of the dendrimer, and are not on non-branching portions. A person of ordinary skill in the art would understand that the derivatizing at an “exterior functional site” is on

the branches of the dendrimer. If the conventional dendrimers of Kim *et al.* (with derivatized exterior functional sites) are used to prepare a sol-gel dendrimer capillary column following the teachings of Malik and Wang, it will lead to one of the following two outcomes depending on whether the derivatized arm of the dendrimer is sol-gel-active or not:

- (1) If the derivatized arm of the dendrimer is not sol-gel active, it will lead to a capillary column where the dendrimer is not chemically bonded to the sol-gel substrate of the created stationary phase coating, and therefore, this dendrimer will be easily washed off or lost during capillary preparation, conditioning, or operation.
- (2) If the derivatized arm of the dendrimer is sol-gel active, it will lead to a stationary phase where the dendrimer is attached to the sol-gel substrate by the branching structure (not by a non-branching portion) since the derivatization is carried out on the exterior functional sites (*i.e.*, on the branches). Such architecture of the sol-gel dendrimer stationary phase is undesirable since it will drastically reduce the number of terminal functional groups on the dendrimer available for interaction with the analyte molecules. This is in direct contrast with the present invention, in which the dendrimer can be chemically attached to the sol-gel substrate by the non-branching sol-gel active portion, thereby exposing all the terminal functional groups on the dendrimer for effective interaction with the analyte molecules. Thus, a person of ordinary skill in the art would not be motivated to combine the teachings of Malik and Wang with those of Kim *et al.* and, moreover, would not even arrive at Applicants' claimed invention even if the teachings of Malik and Wang and the Kim *et al.* publication were combined.

Applicants respectfully assert that the Newkome *et al.* patent does not cure the deficiencies of the Malik and Wang publication, the Neumann *et al.* patent or the Kim *et al.* publication. The Newkome *et al.* patent does not teach or suggest how to chemically bind an isocyanate monomer-based dendrimer to a sol-gel substrate by the non-branching sol-gel active portion of a dendrimer. Thus, the Newkome *et al.* patent suffers from the same failings as the Neumann *et al.* patent and the Kim *et al.* publication.

As the Examiner is aware, it is well established in patent law that in order to support a *prima facie* case of obviousness, a person of ordinary skill in the art must generally find both the suggestion of the claimed invention, and a reasonable expectation of success in making that invention, solely in

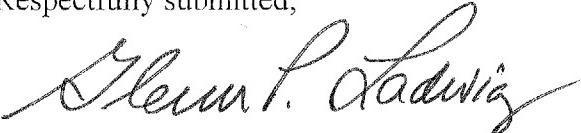
light of the teachings of the prior art and from the general knowledge in the art. *In re Dow Chemical Co.*, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). One finds neither the suggestion, nor the reasonable expectation of success, of Applicants' claimed invention in the cited references. Accordingly, reconsideration and withdrawal of the rejections under 35 USC §103(a) is respectfully requested.

In view of the foregoing remarks, Applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



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